

US EPA ARCHIVE DOCUMENT



Behavioral shifts in predators and prey due to sub-lethal pesticide exposure

Environmental Issue

Sub-lethal concentrations of pesticides are prevalent and known to alter an organisms' behavior. Behavior plays an important role in species interactions. Pesticides may alter the outcome of species interactions. **EXAMPLE:** Sub-lethal pesticide levels make prey more vulnerable to predation.



Scientific Approach

Predator and two prey in pesticides
Two tadpole species were examined in the presence of crayfish for 7 days in the pesticide carbaryl at 50µg/L. **Treatments**

Pesticide/Predator	Pesticide/No Predator
No Pesticide/Predator	No Pesticide/No Predator

Observations

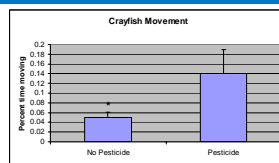
Survivorship and anti-predator behavior of tadpoles and predatory behavior of crayfish.



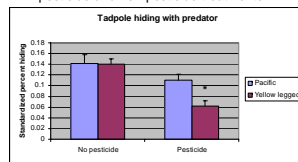
Abstract

Sub-lethal exposure to pesticides is common in aquatic systems. This study examines the combined effects of two low-risk stressors (predator and pesticide) on two species of tadpoles. Yellow-legged frog tadpoles exhibited reduced anti-predatory behavior in pesticide treatments and hence greater mortality from the predator. Further study on pesticide-induced behavioral shifts is needed, particularly in predator-prey interactions.

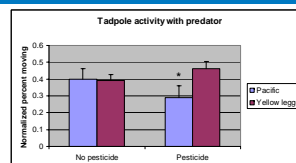
Figures



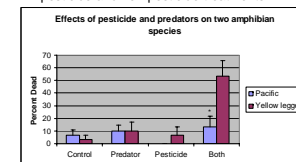
Average crayfish movement in pesticide and non-pesticide treatments.



Average tadpole hiding (with a predator) in pesticide and non-pesticide treatments.



Average tadpole movement (with a predator) in pesticide and non-pesticide treatments.



Average tadpole survivorship in all four treatments.

Impact

- Tadpole species respond behaviorally different to carbaryl exposure.
 - In the presence of carbaryl and a predator, yellow-legged tadpoles exhibit relatively reduced anti-predator behavior. Pesticide exposed yellow-legged tadpoles are more active and hide less compared to predator only treatments.
- Yellow-legged frog tadpoles suffered higher mortality when exposed to both predator and pesticide.



Conclusion

- Multiple stressors have lethal effects.
 - Simultaneous pesticide effects on prey and predator behavior can enhance predation rates. Pesticides alone may not be lethal, but if they alter behavior prey are more susceptible to predators.
- Need better understanding of sub-lethal pesticide effects in natural settings.

